WHERE DO PROCEDURES SIT WITHIN A COMPETENCE MANAGEMENT SYSTEM?

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Despite the hierarchy of risk controls, and a focus on engineered defences, high hazard industries will always have some reliance on human performance. One of the key challenges is therefore procedural compliance – ensuring that staff are able to undertake their tasks correctly – and do so. It is therefore important that the organisation is able to ensure that their workforce not only understands the procedures but also has the competence to carry out the tasks.

An approach for procedural development was created which intended to ensure that procedures not only reflected the safe methods by which the processes should be conducted but also that training and competence issues were addressed in an integrated manner. In a departure from an existing approach to procedures development, the approach focused less on procedures being documents detailing task steps and instead focused on procedures forming part of the control and management of competency.

The approach included the following elements:

- Clarity of the role of procedures and training in assuring task performance;
- Early focus on the training needs and process, and on the competency claims;
- Procedures and training documentation being developed in parallel;
- Explicitly linking the level of detail in procedures and the competency claims on staff;
- Explicitly considering competence assessment process and criteria;
- Procedures properly reflecting the process (and that the claimed competencies are both necessary and relevant);
- Procedures being fit for purpose and reflecting the user requirements.

This paper describes the approach used to develop procedures and training documentation in an integrated manner, including the key lessons learnt.

KEYWORDS: Procedures, Procedural Development, Training, Competence Management

INTRODUCTION

The development and use of procedures is an integral part of ensuring successful human task performance. Procedures should provide individuals with information on the way activities are to be performed such that they facilitate consistent technical, safety and quality standards. Procedures also serve the purpose of demonstrating compliance with regulatory requirements and furthermore, form an essential part of any robust competence management system.

If not developed correctly, procedures are of limited value. In addition, the best written procedures will fail if they are not followed. Ultimately, the benefits of well written and structured procedures are reduced work effort, consistent task performance conducted to the same safety and quality standards and, potentially, more effective and efficient competence development (training and experience).

There are an abundance of accident and incident reports which cite 'failure to comply with procedures' as a contributory factor. It is rare to be able to exemplify where following procedures has averted disaster. However, one example which has highlighted the importance of effective training combined with following procedures was in the case of US Airlines Flight 1549′s successful emergency landing in the Hudson River. An interview with the Pilot Captain Chesley Sullenberger (Huffington Post, 2009) revealed that a combination of his extensive flying experience, simulator training and compliance with emergency procedures led to the safe landing of the plane in the Hudson River, averting potential disaster.

WHAT IS COMPETENCE?

Competence is important in controlling risks and more specifically plays an important part in ensuring that individuals are able to undertake tasks correctly, and do so. All procedures and processes make implicit or explicit claims on competence – whether the task involves driving a car (with competence assessed by formal tuition and test requirements), or assembling flat-pack furniture, where the designer makes assumptions about the consumer's ability to understand instructions and use hand tools.

Whilst competence is a widely used term, it is not always well understood; certainly it is more than just depth of knowledge or technical skill alone. Competence in the high hazard industry means individuals have the ability to undertake tasks to a required standard which thereby ensures that tasks are not only performed successfully but also safely (HSE, 2002).

An effective Competence Management System will help ensure the competence of staff by controlling, in an

integrated manner, the cycle of activities that will create, assure, maintain and continually develop the competence of staff. In order to achieve this, the foundation of any competence management system should include:

- A robust analysis of the tasks that individuals have to perform;
- An assessment of the reasons why these tasks might fail in relation to competence;
- A clear understanding of the required standards of performance (knowledge and skill); and
- Procedures and training that allow staff to achieve the required standards.

COMAH COMPETENT AUTHORITY (2011)

Tasks that involve physical activities which are performed in a set sequence can be readily captured in procedures. However, procedures can also capture cognitive activities, such as fault diagnosis, and need to be structured appropriately to support such tasks. Additional information which provides details such as why tasks are completed in specific ways and other underpinning knowledge, such as information about hazards and risks, should be captured within the supporting training documentation. In order that the training documentation adequately contains the necessary information, and thereby ensures that individuals are competent to carry out a task and understand why it is they are doing so in a particular manner, training documentation needs to be written in parallel with procedural documentation.

It is the coherent development of procedures and associated training which will assure an effective competence management system and hence the desired levels of task performance.

PROCEDURAL COMPLIANCE

Ensuring that employees follow procedures is a challenge for any industry that relies on human performance. Sometimes failure to follow procedures arises from a simple slip or mistake, and the importance of this should not be underestimated (such as speeding due to misjudging the speed of the vehicle). Shortfalls in the design of the system and the human-machine interfaces should not be compensated for through procedures alone. However, there are also several reasons why people may choose not to follow procedures, including:

- A lack of understanding/awareness of the correct procedure;
- The procedure is out of date and does not reflect current working practice;
- Procedures are perceived as complex and inaccessible;
- A failure to understand how a procedure applies in a particular situation;
- Belief that the procedure is incorrect (due to previous inaccuracies);
- Belief that the perceived benefits of an alternative approach outweigh the consequences ("this shortcut will save me time . . .")
- Failure to understand what particular risk is being controlled.

Procedural non-compliance can be controlled through robust competence management arrangements by 1) ensuring that procedures contain the relevant information for operators competently to carry out a process, including such information as the reason why these tasks have to be performed in the manner in which they are specified, and 2) ensuring that training highlights the unsafe conditions that the tasks protect against and how they do so. Therefore, procedures and training need to be developed in parallel.

THIS APPROACH

The approach to developing or updating procedures described in this paper differs from conventional approaches in a number of respects. The principal difference is the focus on competence management as a basis for procedures development. This leads to a more coherent fit between the procedures and other elements of competence development and hence ensures that the procedures better support both the acquisition of competence and its subsequent maintenance.

Procedures that are aimed solely at novice users (pre-competent) will become unwieldy for skilled users, whereas procedures that are optimised for the highly competent user may be inadequate for the inexperienced. Consequently, the starting point for the development of the procedures is to review the necessary competences, how they are acquired, and how the procedures can support differing levels of user competence.

RATIONALE FOR THE WORK

There are a multitude of reasons for an organisation to review a set of procedures. In this instance, there was an emerging recognition that instances of non-compliance with operating procedures had led to a series of abnormal events and feedback from end users suggested the procedures were confusing, difficult to follow and in many places it was unclear why tasks were to be completed in the prescribed sequence. The formal competence management system did not provide sufficient guidance or control at the detailed operational level to inform procedure development. The nuclear Facility that commissioned this work was faced with increasing evidence that the entire suite of operational procedures would benefit from an independent review.

THE APPROACH

OVERVIEW

A review of the suite of operational procedures was conducted. The Facility was not surprised when the outcome from the review identified that the procedures were no longer fit for purpose and that the competence management arrangements would benefit from significant enhancement, in order to ensure staff were competent to carry out the tasks required.

Following the review, an approach was developed for re-structuring the entire suite of operational procedures to align with competence standards ranging from 'novice' through to 'expert'. The process involved:

- Aligning the suite of ∼40 operating procedures against robust competence management arrangements;
- Re-writing the operating procedures to ensure they aligned with recognised good practice;
- Developing training and assessment documentation in parallel with the procedures to align with the new competence standards.

The following section describes the approach adopted to update the procedures.

TRAINING REVIEW

A training review was conducted as the first step in the re-development of procedures and training documentation. The review revealed that:

- There were few formal training documents. Where they did exist they focused largely on technical know-how with little focus on understanding the risks and consequences associated with the current ways of working;
- Procedures were largely used as the primary support for 'on-the-job' training;
- 'On-the-job' training appeared to be the most appropriate form of training – however the training was not formalised through the use of lesson plans, dedicated standards and associated learning objectives.
- There were limited assessment criteria; assessors found those that existed were difficult to use and often led to inconsistencies in how operators were assessed;
- There appeared to be two elements of training and assessment which were not formalised, including knowledge and understanding of the task, and skill based demonstration;
- The information needed to re-write the training and assessment documentation would need to be gathered in parallel to that for the procedural development, as it would broadly come from the same sources and needed to be considered in conjunction with the procedural guidance.

PROCESS OF PROCEDURAL RE-DEVELOPMENT

The process for the re-write of the operating procedures and training documentation, as set out in Figure 1, included:

- A walkthrough of the process;
- Interviews with end users;
- Hierarchical Task Analysis of the process;
- Re-write of procedures;
- Technical Review and verification walkthrough;
- Development of training material.

Walkthrough – the purpose of this initial walkthrough with users was to ascertain if the process was still reflected within the procedure and vice versa.

Interview – a face to face interview was conducted with end users of the procedures. The purpose was to

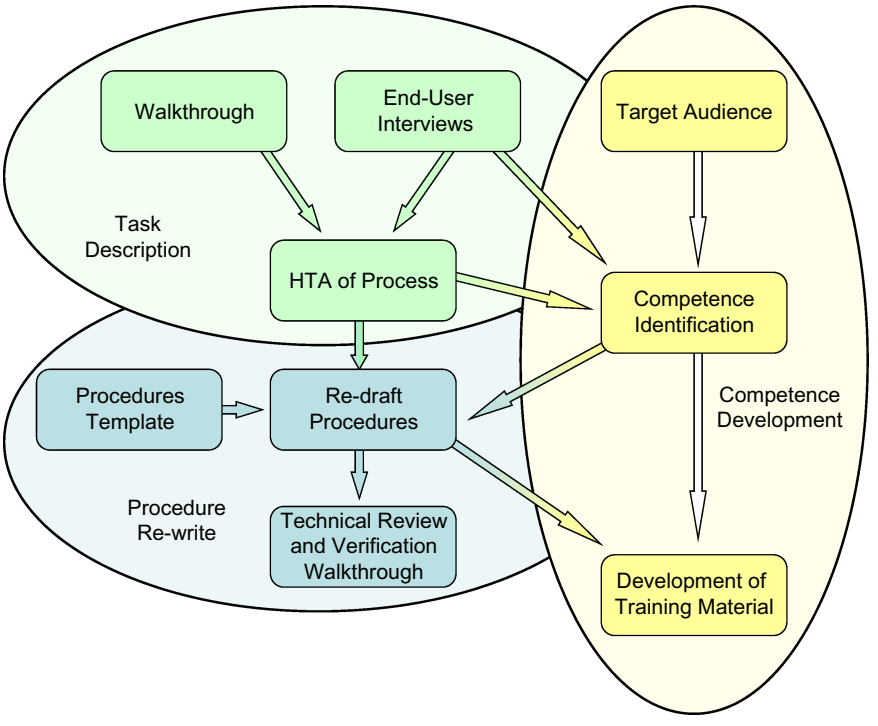

Figure 1.

explore in more detail several key points which would ensure that the procedures and training documentation were fit for purpose, and to understand the target audience for the procedures. The interview explored:

- Shortfalls in the current procedures – this was to establish where non-compliances were occurring, and why, and where the new procedures would need to be amended to reflect current practice (subject to confirmation of the acceptability of any change in method).
- How the procedures would be used – this was to determine the level of detail that should be displayed within the procedure steps. In this instance, the procedures were used predominately for training and for reference use. Therefore, a greater level of detail would be required.
- What were the safety critical steps and the consequences of not doing them correctly – this was to ensure that the correct safety critical steps were highlighted within the procedures and the training covered not only where the safety critical steps where located within the procedure, but also the unsafe conditions they were protecting against;
- Difficult or complex parts of the process and the consequences of not doing them correctly – this information was used to determine if there were any specific user requirements needed within the procedures such as photographs, decision diagrams or process flow charts to aid compliance. In addition it identified the areas where there would need to be a greater emphasis during training and assessment;
- What parts of the process, if any, would benefit from the development of job aids. Discussions revealed that more experienced users did not utilise the procedures on a day to day basis, however, they noted that a flow diagram summarising the key parts of a process would be beneficial.

The interviews also provided information to be fed into the development of the training and assessment arrangements, highlighting the necessary competences and current shortfalls in the manner in which they were acquired.

Hierarchical Task Analysis – with the information gathered from the walkthroughs and interviews, a high level task analysis was completed to establish the task steps, sequence of task steps and location of safety critical steps. This information was used to form the structure of individual procedures. It provided a means of ensuring that the task was fully described, and hence the procedures would be comprehensive. It also provided further information concerning the competences necessary to undertake each task step.

Re-write of procedure – using the task analysis together with the information gathered during the end user interview, a draft of the procedure was developed in accordance with a new template based on recognised good practice (Revitalising Procedures, HSE) relating to the format and presentation of procedural information.

Feedback from end users indicated that the current format and layout of procedures was confusing and difficult to follow. The presentation of information as a whole was word-intensive and the task steps, roles and responsibilities, warnings and cautions, and supporting information were not clearly separated and labelled. Therefore, part of the development process involved separating out procedural steps from supporting information. This ensured that the procedural steps were clear, concise and not cluttered with unnecessary information, and therefore better supported experienced users. Supporting information that was deemed relevant was presented next to each step, thereby ensuring that less experienced users could readily access the additional information which would ultimately form part of their acquired competences.

The procedures were written following current guidance (Revitalising Procedures, HSE) and in accordance with a template created to suite the Facility and to be sufficiently consistent with their house-style and other documentation, to ensure that, where possible:

- Procedures were written in simple plain English;
- Sentences were kept short;
- Each step contained one action;
- Sentences started with a verb;
- Task steps were written in the active rather than passive tense;

Technical review and verification walkthrough by end users – at this stage end users, including supervisors and managers, provided a technical review of the procedural steps and supporting information. Following a technical review, a verification walkthrough was conducted to assure the technical, safety and quality standards in place. It was notable that the new procedural format enabled experienced users to identify a number of errors in the documented descriptions, and hence require further amendments. The time required for this stage in the process should not be underestimated.

Training and assessment documentation – once the procedure was deemed technically correct, the training and assessment documentation was written. The interview with end users helped shape the content of the training.

Discussions with the Duly Authorised Person (who was responsible for training and competence for this process) and existing assessors for the process indicated that assessments would be most practical if divided into two parts.

PART ONE - ASSESSMENT OF THE OPERATOR'S KNOWLEDGE AND UNDERSTANDING

A series of questions were developed, the aim of which was to determine if the operators had achieved the required level of underpinning knowledge and understanding of the process i.e. why tasks are conducted, why tasks are conducted in a specific sequence, why certain steps are considered safety critical and the unsafe conditions that the safety critical steps are protecting against. Example questions included:

> *"What are the [action] checks protecting against?"*

"Why should the label be removed or made illegible at the end of [an action]?"

"Why is there an independent check required when entering data on to the computer system?"

PART TWO – ASSESSMENT OF THE OPERATOR'S SKILLS

This was an area that was enhanced from current arrangements already in place within the Facility. The existing statements were developed into a structured set of skill based assessment criteria which assessors could use to determine if operators were competent to carry out a process. Example skill based assessment criteria included:

"The trainee should demonstrate use of the motorised tunnel as part of a shipment move, including:

- *Conducts motorised tunnel and trolley checks prior to use, including:*
  - *Checks the tunnel is free from other trolleys;*
  - *Checks the trolley is empty and free from defects/damage.*
- *Enters details of the shipment move onto the computer system;*
- *Waits and checks . . . "*

ENGAGING WITH END USERS

Engaging with end users was integral to the success of this process. Throughout the whole process the end users were consulted to ensure that the procedures were fit for purpose, easy to read and understand, and practical. Engaging with the end users also helped to ensure that they had 'buy-in' to the new procedures by contributing to their development. In our experience, if operators have been involved in the development of procedures they are more likely to comply with them. Whilst it is important to engage with end users, consideration needs to be given to the time it takes to engage with them and sufficient time should be incorporated into the overall procedure development process.

BENEFITS OF THIS APPROACH

What has been detailed above is a series of elements which form a cohesive process that helps to ensure procedures contain the competencies needed to complete a task successfully and do so. Part of the successful review of the procedures has been due to this integrated approach taken that develops procedures and training documentation in parallel.

By undertaking the development in parallel, it has been possible to address the trade-offs between detailed procedures/less competent operators and competent operators/high-level procedures. The engagement with the end-users allows the development process to make justified decisions on the extent of any claims on competence, or the extent to which tasks are described in great detail. It ensures that the assessed competences, and hence the abilities of the end-users, will be properly matched to the task demands and procedural detail, and also that the training and competence development process is focussed on the necessary task demands. It also ensures that the competence development process is properly supported by the available procedural documentation.

The immediate benefits of this holistic approach to procedural development have been apparent. The procedures are written clearly in a new template and the Facility has increased confidence that individuals have the necessary competencies. Indeed the central training function has endorsed the training documentation as exemplars of what they would like to see implemented site-wide. Other organisations which adopt the above approach are likely to see:

- Improvement in task reliability;
- Decreased training time (including avoidance of unnecessary training);
- Training delivered in a standardised and consistent manner;
- Clear standards and expectations of task performance;
- Greater confidence in the competence of its employees;
- Reduction of non-compliance from end user engagement in the approach;
- Procedures which accurately reflect the task, which again will reduce procedural non-compliance.

APPLICATION OF APPROACH

The approach detailed within this paper can be applied to any industry that relies on human performance. Whilst this paper describes the use of the approach for reviewing existing procedures, it can also be applied to the development of new procedures and significant amendments to existing procedures.

However, whist the approach detailed in this paper can be applied in these cases, particular emphasis must be placed on the initial phases of the approach. This includes the initial walkthrough, interview with end users and task analysis. Particular attention to these stages of the approach, and a focus on the implications for competence, will help to ensure that the new procedures accurately reflect the task and the demands of those tasks in terms of competence.

The approach was implemented because of increasing evidence that the procedures were no longer fit for purpose. However, is this the only instance in which we would wish to review existing procedures? Thinking about non-malicious procedural non-compliance, why might a very experienced operator with good intent deviate from a procedure? Have they discovered other ways of carrying out a task which are (or they consider to be) safer and quicker? Given the range of drivers that can encourage non-compliance, the approach detailed here is more likely to reveal not only the underlying cause(s) of non-compliance

but also practical opportunities for reducing the likelihood of those non-compliances.

'TOP TIPS'

The following section provides some considerations when reviewing procedures within a competence framework:

- Conduct a training review to establish:
  - What training documentation and arrangements currently exist? What type of training is currently provided?
  - What training do people need (and who are the procedure users)?
  - How can you ensure it is delivered in a consistent way?
- Conduct a walkthrough and task analysis to establish:
  - Task sequence/Deviations from current procedures and reasons why;
  - How the task should be done, by whom, with what equipment and to what specification;
  - When the task should be undertaken, in what order and why does that matter?
- Conduct an interview with end users to determine:
  - What level of detail is needed within the procedures (Novice/expert user?)
  - Whether the more experienced users would benefit from a job aid?
  - What are the safety critical/difficult/complex steps?
- Follow general guidance on writing procedures to ensure:
  - Procedures were written in simple plain English;
  - Each step contains one action;
  - Task steps start with a verb;
  - Procedures are written in the active tense.
- Develop your training documentation in parallel with the procedure.
- Training should focus on the critical tasks i.e. those activities that, if not done competently would have a significant adverse consequence;
- Identify what individuals must know and be able to do perform the identified critical tasks and write them in simple, plain language;
- Safety critical tasks should be highlighted clearly within procedures and further details provided within training documentation on why these are safety critical tasks and what the unsafe condition is that they are protecting against.
- Training and assessment should be structured in two parts; firstly to assess knowledge and understanding of a task, secondly to assess that an individual can demonstrate the required skills to complete a task :
- General tips:
  - Ensure that the end users are engaged in the review process from the start.
  - The time needed to review and develop procedures should not be underestimated.

CONCLUSIONS

This approach to reviewing procedures as part of a competence management system can be applied to any industry that relies on human performance. It will help to ensure procedures are fit for purpose and that they form an integral part of the competency management arrangements, thereby ensuring that employees are able and ready to follow procedures.

The principal element of the approach, and the one that has been recognised by the Facility as being key to realising the benefits, has been the focus on clarifying the necessary competences and the manner in which they are acquired, assessed and maintained. This has allowed the Facility not only to improve the manner in which it does those things, but also to produce a suite of procedural documentation that positively supports competence management. This in turn is expected to lead to significant improvements in compliance, as well as in overall task reliability and performance.

Most organisations make implicit and explicit claims on procedures and competence. Taking a holistic approach increases the likelihood that those claims are valid and realistic.

Whilst it cannot pretend that effective procedures development is a simple or short task, this approach does give confidence that the maximum benefit will be realised, and that the investment in good procedures and training will be rewarded.

REFERENCES

Revitalising Procedures, HSE - http://www.hse.gov.uk/humanfactors/topics/procinfo.pdf

Chesley Sullenberger 60 Minutes Interview: Pilot, Crew Recount Hudson River Crash (VIDEO), Huffington Post, 2009 (http://www.huffingtonpost.com/2009/02/09/chesley-sullenberger-60-m_n_165179.html).

Developing and maintaining staff competence. HSG197 HSE Books (2002).

Inspection of Competence Management Systems at COMAH Establishments. COMAH Competent Authority (2011).